UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 1
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OFFICE OF THE
REGIONAL ADMINISTRATOR

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Re: Interstate 93 Improvements Salem to Manchester, New Hampshire, Draft Environmental Impact Statement (CEQ Number 020405)

Dear Ms. Murray, Ms. Laffey and Ms. Godfrey:

The Environmental Protection Agency-New England Region (EPA) has reviewed the Federal Highway Administration's (FHWA)/New Hampshire Department of Transportation's (NHDOT) Draft Environmental Impact Statement (DEIS) for the widening of Interstate 93 (I-93) for 19.8 miles from the Massachusetts/New Hampshire state line to Manchester, New Hampshire. We submit the following comments in accordance with our responsibilities under the National Environmental Policy Act (NEPA), Section 309 of the Clean Air Act, and Section 404 of the Clean Water Act.[1]

I-93 is the key highway from the greater Boston area to New Hampshire, and we understand its great importance to the state. The final form of the project and associated mitigation will influence land use, environmental health, and quality of life for a large portion of New Hampshire for many years

[1] In addition to NEPA, this letter is provided in response to a Corps of Engineers public notice dated October 11, 2002 soliciting comments on this project.

to come. The preferred alternative identified in the DEIS includes work to widen I-93 from 2 lanes to 4 lanes in each direction, upgrades and relocation work at several exits and interchanges, and the construction of three new park-and-ride lots at Exits 2, 3, and 5. Other components of the project include a bike path that will connect to the park-and-ride lots and a regional bike system, and the acquisition of land which could accommodate a potential commuter rail alignment in the highway corridor. The project is estimated to cost approximately $400 million, exclusive of mitigation costs.

The publication of the DEIS followed a period of intense coordination between the EPA, NHDOT/FHWA, and other federal agencies to streamline the environmental review process through the identification and discussion of project-related issues of concern. Our close coordination with the FHWA/NHDOT began in 2000 when we agreed to participate in a pilot environmental streamlining process established by Congress.[2] We commend the hard work of staff from FHWA and NHDOT in conjunction with resource agencies that has led to the production of this DEIS. As part of these interagency efforts, EPA offered support and early input regarding a number of core issues, including our opinion that the best solution to congestion in the corridor is a multi-modal transportation system, and that growth induced by the highway is likely to be significant and of environmental concern. We urged serious consideration of and commitment to additional transit service, particularly commuter rail, within the project corridor; offered suggestions as to how growth induced by the project might be analyzed; and offered our recommendations about the appropriate level of mitigation for project impacts. As we have stated throughout the process, EPA supports the widening of I-93 in concert with appropriate mitigation for the significant impacts the project will cause and as part of a broad transportation strategy that includes improved bus and future rail service.

We commend FHWA and NHDOT for the analysis of growth that would be induced by this project, which was one of the best we have ever reviewed for a transportation project in the New England region. We are pleased that the use of the Delphi/expert panel process, a first of its kind for the New England region, resulted in reasonable and credible estimates of the population and employment increases that the highway is likely to induce in a 29-town area of southern New Hampshire and northern Massachusetts (the study area). As you know, the expert panel predicted that if the highway is doubled in size as proposed, on average 40,626 more people and 21,527 more jobs are expected to move into the area by 2020 above and beyond the growth that will occur without the highway improvements. While we believe NHDOT used a groundbreaking and effective approach to estimate population and employment growth likely to be induced by a wider I-93, we do have some concerns, detailed in the attachment, about the manner in which the DEIS translates these estimates into environmental impacts.

We reviewed the proposed action from the standpoint of how it would affect the natural environment within our areas of jurisdiction and expertise, especially with respect to water resources, wildlife habitat, and air quality. Our chief concerns center around the long range impacts to wetlands, wildlife, drinking water, and other natural resources from road construction and from the thousands of acres of induced development. As you know, during the 18 month streamlining process that

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[2] We note that the recent selection of the I-93 widening project under Executive Order 13274 will continue the intensive coordination that characterized the interagency discussions in advance of the publication of the DEIS.

preceded the publication of the DEIS, the I-93 Board of Directors focused on issues such as the range of alternatives and potential mitigation sites and did not address other impacts of the project which we are now seeing analyzed for the first time in this DEIS. The major findings of our review of the DEIS are provided below and in the Additional Detailed Comments attachment to this letter.

We conclude that the environmental impacts of the project would be significant, and should be addressed through additional analyses, mitigation, and other commitments in the FEIS. Specifically:

- **The NEPA analysis reveals that impacts from the highway expansion, combined with other reasonably foreseeable impacts in the study area, will result in significant impacts to the aquatic environment, and need to be addressed in a more substantial way than NHDOT currently proposes.** Based on the information provided in the DEIS, the widening of I-93 will cause major adverse impacts to the aquatic environment in New Hampshire. In addition, by the year 2020 this highway will result in tens of thousands of acres of development in more than 29 towns in New Hampshire and Massachusetts. That development will greatly fragment the large blocks of undeveloped land that provide and protect much of the region's drinking water, aquatic life, and biodiversity. Of concern under the § 404(b)(1) guidelines are the effects associated with filling 85 acres of wetlands, which would be severe and would contribute to significant degradation of the aquatic environment. (40 C.F.R. Part 230). EPA is proposing measures that would, through preservation of sensitive areas, reduce the potential for significant degradation of the aquatic environment consistent with the § 404(b)(1) guidelines. This proposal is described in the Additional Detailed Comments attachment to this letter. Note that we also support the elements of NHDOT's current mitigation plan, including the technical assistance program. Finally, as we have stated, we are eager to meet with your agencies to discuss how NHDOT's current mitigation proposal can be strengthened to comply with federal regulations, either by adopting the proposal discussed in the attachment, or by developing a plan that provides comparable benefits.

- **EPA believes that the road salt mass-balance models used in the DEIS to analyze impacts to the water quality of surface and ground water underestimate the risk that road salts would pose to sensitive aquatic species and water supplies in the project area.** The models are not calibrated by on-site measurements of sodium and chloride in perennial surface water bodies and 16 public water supply wells in the I-93 corridor to characterize worst-case projections during the winter and spring seasons. For example, available monitoring information shows increased concentrations of sodium and chloride in Canobie Lake, an important source of drinking water for the Town of Salem, NH, and to the Pennichuck Water Works' W&E wellfield, which serves customers in Windham, NH. Salt in water supplies is especially a concern to older populations and those with high blood pressure.

  At the present time, based on the information currently available, EPA is unable to assess whether the project would comply with the New Hampshire water quality criteria for chloride as cited in Env-Ws 1703.21(a) and (b), and New Hampshire's antidegradation statute (Env-Ws 1708) for surface water quality, and with the national secondary drinking water standards

(Env-Ws 319.01). EPA understands that NHDOT intends to conduct water quality sampling this winter, and it welcomes the opportunity to assist in this effort. Our comments on road salt impacts, mass-balance modeling and assessment are provided in the attachment to this letter. These studies should be used to analyze risks to water quality and the information presented in the FEIS along with any necessary mitigation.

- **The DEIS does not provide sufficient information to determine the air quality impacts of the project alternatives.** EPA's scoping comments had recommended that the DEIS include a mesoscale analysis of the air quality impacts, using EPA's MOBILE emission model. Unfortunately, the DEIS does not contain the information we requested. A mesoscale analysis addressing volatile organic compounds (VOC) and nitrogen oxide (NOx) emissions associated with the alternatives, comparing the proposed project to the no build or no action alternative, for existing and future years, would allow for a comprehensive comparison of the relative difference of each alternative with respect to air quality. This analysis would also provide critical information about how the project alternatives would affect future transportation conformity determinations. If the emissions associated with an alternative are high, it may be difficult for New Hampshire to show conformity for future transportation plans containing that alternative. Indeed, New Hampshire may have to adopt new control strategies in order to satisfy transportation conformity tests. Identification of such project alternative impacts should be identified now, not later when the state's ability to demonstrate conformity of its transportation plans hangs in the balance. EPA consequently recommends again that NHDOT/FHWA conduct a mesoscale analysis, using EPA's MOBILE6 emission model, to determine the air quality impacts of each project alternative. EPA also notes that NHDOT/FHWA must evaluate roadway locations within the Manchester Carbon Monoxide (CO) Maintenance Area in order to satisfy the CO hot spot test requirements of the Transportation Conformity Rule, 40 CFR 93.116(a).

Finally, EPA believes that a long-term solution to the traffic congestion on I-93 must include alternatives to single occupancy vehicle travel which are not as subject to congestion due to construction, accidents, bad weather and glare. Specifically:

- **The FEIS should provide more specific information about the commuter bus and high-occupancy vehicle services that will be included in this project.** The availability of abundant and convenient parking is essential to any effort to encourage commuters to use commuter buses and other high-occupancy vehicle services. The DEIS discusses proposed options for expanded commuter bus services and the option of an HOV lane on I-93. Expanded park and ride facilities at exits 2, 3 and 5 will facilitate carpooling and increased privately owned commuter bus service to Massachusetts. The addition of other amenities at these lots, such as an indoor waiting area with light, heat, seating, and restrooms would make these facilities more user friendly. Facilities with these simple amenities could also help attract more riders, thereby reducing traffic congestion and air pollution on the highway. According to the alternatives section of the DEIS, the bus service parking lots at exits 2, 3 and 5 will be expanded to include 430, 525, and 500 parking spaces respectively. EPA recommends that the FEIS confirm that the preferred alternative includes parking lots of these sizes and specify any plans for amenities that could encourage their broadest possible

use. In order to maximize the use of the bus service, these lots should be planned so that they can jointly provide parking for bus and rail service (as in Portland, ME, Woburn, MA and many other locations in the region). Similarly, the FEIS should clarify that the widened highway will include room for the buffer needed to accommodate an HOV lane in the event that, at some future time, NHDOT decides to dedicate one lane to high-occupancy vehicles. While stated in the alternatives section, the preferred alternative discussion makes no mention of leaving room for the buffer needed to add an HOV lane.

- **NHDOT should go beyond an agreement to study transit options in the corridor with the Commonwealth of Massachusetts and commit to a firm schedule of implementation.** Although the DEIS shows a commitment to bus service in the corridor, buses, unlike rail, are affected by congestion associated with highway construction, accidents, bad weather and glare and rail offers advantages bus service cannot. As you know, based on analyses of transit ridership and highway level of service, EPA agreed with NHDOT's proposal to drop rail as a stand-alone alternative in the DEIS so long as there was a binding commitment among NHDOT, Massachusetts Executive Office of Transportation and Construction (MA EOTC), and the I-93 "Board of Directors" (resource agencies) to conduct a bistate transit study and work to implement the preferred transit system alternative in a timely way. Although EPA recognizes that NHDOT has been making a good faith effort to work with MA EOTC, the binding commitment needs to be executed and reflected in the FEIS, along with a complete schedule. As detailed in the attachment, we also recommend that FHWA and the two state transportation agencies take a second look at the utility of an HOV lane from NH to the I-495/I-93 interchange. These commitments to transit and to reevaluate the HOV lane are important because they will help reduce congestion and air pollution in the entire I-93 corridor, including the section that runs from the New Hampshire border to Boston. We have previously stated this concern and we continue to be concerned that increased traffic flow on I-93 in New Hampshire, made possible by widening, will contribute to increased traffic congestion and consequently air pollution in the Massachusetts portion of I-93. These increases in traffic along the I-93 corridor will make it more difficult for Massachusetts and New Hampshire to attain the health-based ground-level ozone standard.

We continue to encourage NHDOT /FHWA to enhance the mitigation plans in the DEIS to more fully address our concerns. If that is done, we believe that NHDOT can reduce the overall impacts of the project to an acceptable level. EPA continues to support the I-93 widening with adequate mitigation and we stand ready to help to expedite the environmental review process for this project.

Our NEPA responsibilities require EPA to review and rate all federal agency EISs according to a national system to promote national consistency in federal environmental reviews. Because of the significant issues that remain to be addressed to deal with project mitigation, wetlands and water supply impacts, and air quality, we are rating the overall project "Environmental Objections–Insufficient Information" (see attached rating sheet for a full explanation of this rating). This rating should not be construed to mean that the problems with the DEIS are unresolvable; but it does indicate that the issues we have identified need to be resolved prior to the close of the NEPA process and in advance of a permit decision.

Please feel free to contact Timothy Timmermann of EPA New England's Office of Environmental Review (617-918-1025) or Carl DeLoi, Director of our New Hampshire Unit (617-918-1581) if you have any questions about this letter.

Sincerely,

Robert W. Varney
Regional Administrator

attachment

Summary of Rating Definitions and Follow-up Action

Environmental Impact of the Action

LO--Lack of Objections
The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC--Environmental Concerns
The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact. EPA would like to work with the lead agency to reduce these impacts.

EO--Environmental Objections
The EPA review has identified significant environmental impacts that must be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative. EPA intends to work with the lead agency to reduce these impacts.

EU--Environmentally Unsatisfactory
The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potentially unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the CEQ.

Adequacy of the Impact Statement

Category 1--Adequate
EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2--Insufficient Information
The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses, or discussion should be included in the final EIS.

Category 3--Inadequate
EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

Additional Detailed Comments Attachment to December 16, 2002 letter from Robert W. Varney to Carol Murray, Kathleen Laffey and Christine Godfrey on the Draft Environmental Impact Statement for Interstate 93 Improvements Salem to Manchester, New Hampshire

EPA's Previous Comments/Coordination

EPA has participated as part of an interagency team established in August, 2000 with the goal of streamlining the environmental review process for this project. As part of that work we have attended regularly scheduled project meetings and have offered numerous comments during meetings and in writing in advance of the publication of the Draft Environmental Impact Statement (DEIS). Our scoping comments on the project in August, 2000, expressed concerns about direct impacts to the aquatic environment which the project would cause as well as those related to long-term growth induced by the highway expansion, especially due to fragmentation of the remaining large blocks of land remaining in the area. We also asked for a mesoscale air quality analysis for all of the alternatives including the no build/no action alternative, recommended that environmental groups be directly involved in project meetings, and highlighted our concerns that the cumulative impacts stemming from the induced growth will likely be even more substantial for the aquatic environment than the direct losses. We recommended that the DEIS evaluate the effect of the project on traffic flow, congestion and delay along the entire Concord, NH - Boston, MA I-93 corridor since some portion of the traffic in the segment of the road to be widened will come from or travel to Massachusetts. This will contribute to traffic congestion and air pollution south of the New Hampshire border. Under prevailing wind patterns, this increase in emissions will make it more difficult for Massachusetts and New Hampshire to attain the health based ground level ozone standard.

Most recently, our letter of September 5, 2002, provided detailed comments about the NHDOT/FHWA draft mitigation package intended to mitigate for the impacts on aquatic resources due to the proposed project. Our comments at that time provided detailed recommendations and asked that they be included and considered in the DEIS document. We also expressed our concern that despite good faith efforts of the agencies to work cooperatively in the streamlining process, the comments offered by EPA and other natural resource agencies on the mitigation plan were largely disregarded. While we note that our September, 2002, comments appear in an appendix to the DEIS, a close look at the mitigation plan provided in the DEIS reveals no changes of substance since our last round of coordination with NHDOT/FHWA. Consequently, the current mitigation plan does not address impacts sufficiently to allow the project to comply with the § 404(b)(1) Guidelines. This attachment describes that deficiency more fully, expands on comments included in the cover letter, and includes specific recommendations as to how NHDOT can address these concerns in a way that would reduce the impacts to an acceptable level.

Regulatory Context and Background

NEPA requires that Environmental Impact Statements (EISs) fully discuss significant environmental impacts and reasonable alternatives, including alternatives which would avoid or minimize adverse effects. 40 C.F.R.
§ 1502.1. It also requires that EISs address means to mitigate adverse environmental impacts.

The environmental requirements which must be met by proposals to obtain a Section 404 permit are contained in the Clean Water Act § 404(b)(1) Guidelines (40 C.F.R. Part 230). The Guidelines direct EPA and the Corps of Engineers to protect wetlands in several important ways. These regulations at the outset articulate a clear national policy [§§ 230.1(c),(d)]:

> Fundamental to these Guidelines is the precept that dredged or fill material should not be discharged into the aquatic ecosystem unless it can be demonstrated that such a discharge will not have an unacceptable adverse impact either individually or in combination with known and/or probable impacts of other activities affecting the ecosystems of concern.
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> From a national perspective, the degradation or destruction of special aquatic sites, such as the filling operations in wetlands, is considered to be among the most severe environmental impacts covered by these Guidelines. The guiding principle should be that degradation or destruction of special aquatic sites may represent an irreversible loss of valuable aquatic resources. The Guidelines are binding regulations, and the regulatory "tests" in the Guidelines at Section 230.10(a)-(d) are independent. Among other things, the Guidelines impose requirements regarding project alternatives, water quality effects, significant impacts to the aquatic environment, and mitigation. The applicant must demonstrate compliance with each subsection in order to receive a permit; one subsection cannot override the need to comply with the other subsections.

To enforce this general policy, the Guidelines impose specific restrictions at § 230.10. With respect to preventing unacceptable impacts, § 230.10(c) states, in part, that, "no discharge of dredged or fill material shall be permitted which causes or contributes to significant degradation of waters of the United States." Findings of significant degradation shall be based on appropriate factual determinations, "with special emphasis on the persistence and permanence of the effects...." The regulations explain that significant degradation includes, among other things, "significant adverse effects" to wildlife, drinking water, special aquatic sites, and ecosystem diversity, productivity and stability. As an example of significant impacts, the Guidelines cite loss of fish and wildlife habitat or the capacity of a wetland to assimilate nutrients or purify water. In assessing the significance of the impact, the Guidelines require consideration of whether the project would change breeding and nesting areas, escape cover, travel corridors, and preferred food sources for resident and transient wildlife species associated with the aquatic ecosystem or disrupt the normal functions of the ecosystems at the site and lead to reductions in overall biological productivity (§ 230.32).

For many years federal regulations have required that, in determining whether a Clean Water Act § 404 permit can be issued to authorize discharges to waters of the United States, the Corps of Engineers must consider not only the direct aquatic impacts, but also secondary and cumulative aquatic impacts. See 40 C.F.R. §§ 230.11(g) and (h). All of these impacts must be considered when determining, among other things, whether the proposed project would cause *or contribute* to significant degradation of the aquatic environment. Where the combined effect of direct, secondary, and cumulative impacts would cause or contribute to significant degradation, the permit must be denied (see 40 C.F.R. § 230.10(c)) unless measures are employed to reduce the impacts, through avoidance or compensatory mitigation, to below the significance threshold. In this instance, our comments on the DEIS include recommended measures for this project that would reduce the overall potential for significant degradation of the aquatic environment consistent with the § 404(b)(1) Guidelines. In addition, the regulations require that all impacts that are unavoidable and non-significant must be mitigated to the extent "appropriate and practicable" (see 40 C.F.R. § 230.10(d)). It is our belief that whatever measures are necessary to address significant degradation would also be sufficient to satisfy this provision of the guidelines.

Environmental Setting

Overview

Wetlands within the study area provide high quality, diverse habitat for fish and wildlife, a travel corridor for upland and wetland wildlife, food web production for on-site and downstream biological communities, nutrient and pollutant uptake and assimilation, floodwater storage, and flow moderation. The wetlands support high natural biodiversity for plants and animals, and provide a wide spectrum of functions and values, including wildlife habitat; protection of water quality; and recreational activities, such as bird watching, hunting, trapping, and canoeing. Many sites also provide for groundwater recharge and discharge, flood flow alteration, sediment, nutrient, and toxicant removal and transformation, and uniqueness - heritage values.

The study area drains primarily to the Merrimack River and in part to Great Bay, areas of widely recognized environmental importance. Several streams, such as Cohas and Little Cohas Brook, Beaver Brook, Golden Brook, and the Spickett River drain to the Merrimack River, while the Lamprey and Exeter Rivers drain to the seacoast. Numerous public and private entities at the local, state and federal levels, including EPA, have invested millions of dollars on initiatives to protect these resources. This backdrop underscores the need to carefully scrutinize the impacts of the proposal, undertake a concerted effort to avoid and minimize impacts, and formulate effective mitigation measures.

Approximately 20% of the study area contains wetlands, surface waters and adjacent buffers.[1] The region also contains thousands of vernal pools, a special type of aquatic resource critical for many species to breed and survive. New Hampshire Fish & Game (NH F&G) and New

[1] NH Audubon Study – *New Hampshire Resource Protection Project, February, 2002.* The wetland acreage will be less than 20% since this number includes a 100' buffer.

Hampshire Audubon have documented observations of birds, reptiles, and amphibians throughout the study area. The presence of uncommon species in the study area and the large areas of contiguous natural habitats indicate that the remaining habitat blocks and corridors are large enough to maintain diverse wildlife populations. For example, the New Hampshire Fish and Game Department records show that thousands of fur-bearing mammals, such as beaver, otter, fisher, and mink were trapped in the study area during the last decade.

Many large blocks of intact habitat remain in the study area. For example, there are many undeveloped areas over 2,500 acres in size which in total comprise more than 30% of the study area (130,000 acres).[2] In addition to their relatively undeveloped nature, these sites generally contain large wetland/water complexes and corridors that allow wildlife movement between habitats.

The largest lake in the region, Lake Massabesic, in Manchester and Auburn, provides drinking water, open space, and wildlife habitat and opportunities for recreation. Manchester Water Works (MWW) uses this resource to provide drinking water to Manchester, parts of Derry and Londonderry, and other nearby communities. MWW, the largest water supplier in the State (supplying more than 125,000 people), has protected approximately 8,000 acres of land in an effort to protect water quality in the 27,000 acre watershed. Along with Bear Brook State Park (9,000 acres) in Deerfield, Lake Massabesic and its surrounding lands represents the largest protected open space in the region.

As compared with small parcels of land, large parcels of land rich in wetlands are known to support more species, more viable populations, and species that are rare, endangered, and of special management concern. These areas also serve as reserves that provide superior habitat for large and highly mobile wildlife species. Carnivores, such as river otter, fisher, and mink, that require large home range sizes, can and often do move between habitat blocks. The larger, unfragmented habitat blocks in the study area are critical for the long-term survival of many area-sensitive wildlife species that depend on large contiguous tracts. Further, these larger tracts of land often influence a much larger region including other nearby smaller tracts. The continuity of these habitats enhances the ability of the area to maintain viable wildlife populations as animals can easily move within the habitat blocks. Dispersing animals from larger habitat blocks often recolonize areas that have suffered from local extirpations.

NH Audubon's *New Hampshire Natural Resource Protection Project* study used three methods for locating "areas with high natural resource value that most merit protection" within the communities in the study area. The methods included analysis of existing wildlife GIS datalayers; information from local conservation commissions; and information compiled from a group of professional biologists with first-hand knowledge of the region. Some of the key GIS data layers used in their analysis included a map of currently protected land and a map showing all the remaining unfragmented blocks. As part of the Audubon study, 25 sites identified by 2 or

[2] NH Audubon Study, February, 2002.

3 of the above methods were mapped as potential "priority" open space parcels – a designation intended to convey the importance of the parcel's ecological value. Most of these sites were large habitat blocks, usually over 1000 acres in size, containing wetlands, ponds, vernal pools, and streams. Approximately 40 large (greater than 1000 acres) unfragmented blocks also were identified in the study, some of which overlapped with the 25 priority open space parcels. Unfragmented areas have relatively little development or roads and contain mostly forests, wetlands, and open water. We used the Audubon study as one tool to develop a recommended mitigation package (described below).

Wildlife Values

The study area contains valuable wildlife habitat for many different species of birds, mammals, amphibians and reptiles. The majority of these species, including those identified below, use and depend on wetland systems. The New Hampshire Heritage Program considers some of the species in the study area to be uncommon, rare, threatened, or endangered in the state. Many of these species utilize or depend on wetlands or riparian systems for survival. Uncommon or threatened species in the study area include American bittern and eastern screech owl. Many of these uncommon species need large tracts of land to survive, such as northern waterthrush, barred owl, yellow warbler, and red-shouldered hawk. Many mammals use or depend on wetland systems to survive. Species within the study area that are considered uncommon or rare in the state include bobcat and southern bog lemming. Uncommon reptiles and amphibians include blue spotted salamander, Blanding's turtle, and eastern hognose snake.

Area-sensitive birds typically require extensive tracts of land for successful breeding and they decline rapidly with habitat fragmentation and reductions in forest.patch sizes. Some of the birds species in the study area susceptible to these fragmentation effects include the black-and-white warbler, Louisiana waterthrush, northern waterthrush, red-shouldered hawk, and ovenbird.

The Bear Brook and Lake Massabesic areas provide large intact blocks of land that likely support source populations for many area-sensitive species in the study area such as broad-winged hawk, bobcat and fisher. Offspring from these populations disperse to less suitable habitats where breeding is unsuccessful and populations would disappear without consistent immigration. Moreover, several of these area-sensitive species are long-distance or neotropical migrants, currently suffering habitat destruction of both their breeding grounds in North America and their wintering grounds in Latin America. Long-term population declines have been observed in this group of birds in areas of the U.S. undergoing rapid urbanization. Thus, the relatively large unfragmented habitats within the study area and adjacent to it contribute to maintenance of viable populations of regional forest and wetland bird populations and several neotropical migrant species.

The study area provides a variety of wetland and upland habitat types favored by mammals. NH Fish and Game considers it to be one of the more productive areas in the state for wildlife (E. Orff, NH Fish and Game, personal communication, November 26, 2002). Mammals including black bear, moose, beaver, muskrat, fisher, raccoon, mink, otter, red fox, grey fox, and coyote are

found in the study area. Larger streams and wetlands provide cover and foraging areas for these species and travel corridors are essential for providing access to the large undeveloped tracts of land in the region and the variety of habitat types required. Many mammals require large blocks of habitat in which to forage and breed, and the majority utilize or depend on wetland habitats. Some of the more uncommon mammals within the study area include New England cottontail, woodland vole, and bobcat.

Small mammals utilize a variety of wetland and upland habitat types. Although they typically do not have large home ranges, populations of these small, less mobile mammals are susceptible to habitat fragmentation effects that impact and alter gene flow and population dynamics. Small mammal populations play a key role in the biological community as the essential link in the food chain for several raptor species, such as the red-tailed hawk and great horned owl. They also provide a valuable food source for mammals, such as long-tailed weasels.

The study area contains several reptile and amphibian species of special management concern[3] including: blue-spotted salamander, spotted turtle, wood turtle, Blanding's turtle, and eastern hognose snake. The southeastern portion of the study area in New Hampshire provides the best stronghold in the state for the turtles of special management concern. Their survival and breeding success depends upon high adult survival. In particular, these species live a long time (Blanding's turtles often live as long as humans); have low recruitment rates; travel relatively long distances, often over upland areas, to reach ponds, streams, and wetlands; and move slowly. Such life history characteristics make them especially vulnerable to highways and fragmentation. In addition, road mortality is a significant limiting factor for turtles in the northeast that spend a good portion of the life cycle moving through wetland and upland complexes, such as spotted turtle, Blanding's turtle, and wood turtle (Gibbs and Shriver, 2002). Due to their life history requirements, these species generally cannot recover from annual road deaths to over 3% of the population and generally over 2000 acres of roadless areas are needed for their long-term survival (Gibbs and Shriver, 2002).

Safe travel corridors linking aquatic and nesting habitat are essential for turtle populations to survive. Almost all wetland-dependent species of mammals, birds, reptiles, and amphibians in New England need upland habitat to survive. During some portion of their life requirements--breeding, winter habitat or escaping predation--upland is essential to these wetland dependent species. For such species, a wetland is only as valuable as its access to undisturbed adjacent upland habitat. Removing safe corridors and preventing movement to and from the wetland may cause as certain, if not as swift, a demise for wildlife as filling the wetland itself.

Although relatively small in size, vernal pools are critically important breeding habitats for amphibians and are utilized by other wildlife including turtles and waterfowl. The fish-free waters of vernal pools create preferred breeding habitat for a large number of amphibians; this in

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[3] Species of special management concern are not threatened or endangered, but there is concern that they might become threatened in the future.

turn attracts hawks, owls, snakes, turtles, waterfowl and predatory mammals. Young amphibians dispersing from vernal pools in late summer or autumn distribute much of the productivity of these temporary ponds into upland systems, thereby supporting important terrestrial food webs.

Moreover, some of these species return to their natal pools each year to breed and can live 20 to 25 years. Therefore, destruction of these pools can result in the elimination of entire breeding populations of these species. Many amphibians disperse several hundred feet from their breeding ponds into the adjacent upland habitat after the breeding season has ended. For example, the spotted salamander typically travels 750' from its breeding pond, while the red-spotted newt travels 2000'. Thus, amphibians and reptiles also depend on undeveloped upland habitat adjacent to the pools. Many will not breed again if their natal pools are destroyed due to their fidelity instincts, lack of breeding alternatives, natural predation, and accidents, such as crossing a highway.

Hydrological Values

The vast majority of the wetland communities in the study area are associated with small streams that drain to the Merrimack River or Great Bay. Vegetated wetlands help maintain the quality of rivers and streams and downstream estuaries in a number of ways. First, wetlands help remove and retain nutrients, such as nitrogen and phosphorus, which cause eutrophication of natural waters. Second, wetlands process chemical and organic waste products thereby removing them from contaminated waters. Third, wetlands also trap sediment which can transport adsorbed nutrients, pesticides, heavy metals and other pollutants. Much of this material is either stored in the sediment or converted to useable plant material.

Wetlands in the study area also are critically important for flood control. Wetlands help to slow the velocity of water during floods and storms, reducing peak flood levels by temporarily storing the water that otherwise could cause downstream damage, and then slowly releasing it. Wetlands also are important for groundwater recharge. This is especially true for the wetland systems underlain by stratified drift deposits. Wetlands recharge groundwater more readily in porous soils, such as the sand and gravel soils in the central and northern portions of the study area.

Lake Massabesic, discussed previously, supplies water to Manchester, Derry, Londonderry, Auburn, Hooksett, Bedford, and Goffstown. The Merrimack River is an existing and future source of water supply for a number of communities in New Hampshire and Massachusetts. The communities in Massachusetts that the Merrimack already serves include Lawrence, Lowell, Methuen, and Tewksbury. In addition, the Merrimack River has been considered as a future drinking water supply source for several additional communities, many of which are downstream (e.g., Haverhill and North Andover, MA).

Impacts

The proposed project would result in a major disruption of high quality aquatic ecosystems in the study area. The large direct and indirect impacts to wetlands would displace and eliminate some

wildlife and its habitat, reduce water quality functions, and threaten drinking water resources. Moreover, road salt application on the widened highway may jeopardize drinking water supplies in the corridor and potentially cause violations of state water quality standards. In addition, the project would catalyze new development spanning thousands of acres containing a variety of interconnected wetlands, streams, drinking water supplies, and aquatic resources.

According to the Delphi/expert panel referenced in the DEIS and discussed in this attachment, the project would result in 40,626 additional people and 21,527 jobs over the no-build option in the study area by 2020, resulting in the conversion of tens of thousands of acres of land, including wetlands, waters, and adjacent buffers, which occupy 20% of the landscape. These impacts have a great potential to fragment the larger tracts of land that protect much of the biodiversity and high quality water supply of the region. The impacts described below pertain to all of these environmental losses.

Consistent with the requirements of NEPA, more information needs to be provided in the DEIS regarding wetland functions and values and likely impacts in the study area. The DEIS focuses almost entirely on the wetlands that would be lost by the placement of pavement for the highway. Other than completing the Delphi/expert panel study, the DEIS does not respond in a meaningful manner to our previous comments on the Scoping Report and Rationale Report on impacts other than the direct impacts. For example, we asked NHDOT to investigate opportunities for bridging streams or other areas to allow for wildlife movement; we could not find any information that addressed that issue in the DEIS other than a brief statement that as bridges are replaced, wildlife accommodation will be considered. The FEIS should include more detailed information on proposed wildlife accommodation, including locations. The DEIS discussed and reported the results of the Delphi/expert panel study regarding additional development that would occur due to the highway expansion. But it does not discuss the landscape setting and the likely impacts to the aquatic environment from this additional development. Lacking this discussion in the DEIS, we shaped our comments on the DEIS using available data in a report EPA helped NH Audubon produce entitled, "New Hampshire Resource Protection Project, February, 2002" as well as a mitigation plan developed by EPA and many of the other natural resource agencies involved in the streamlined review process. We recommend that the FEIS incorporate our findings and relevant information from the Audubon report.

The following sections provide a general discussion of the direct and indirect[4] impacts of the project as well as the reasonably foreseeable effects from induced growth that will occur in the study area, followed by specific comments, questions and issues that should be addressed in the FEIS.

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[4]We use the term "indirect impacts" in this letter to refer to effects that are attributable to the project (e.g., polluted runoff, noise, increased animal mortality from collisions with vehicles) but which are not the direct "footprint" impacts due to the placement of fill. These are all effects that must be considered under the Guidelines.

Overview

The preferred alternative would directly destroy approximately 85 acres of wetlands, 4 vernal pools, 46 acre-feet of floodplain, and 250 acres of upland wildlife habitat, and also contribute large quantities of road salt to waterbodies along the corridor, including drinking water supplies. Destruction of wetland acreage correlates with loss of functions and values including habitat destruction, reduced primary and secondary productivity and alteration of hydrological functions (e.g., flood storage, low flow maintenance, nutrient and toxicant transformation, sediment trapping, groundwater discharge and recharge). Compared to the existing road, the expansion of I-93 will impose a far great barrier to wildlife movement, cause far more deaths from wildlife attempting to cross the road, and cause greater impacts to interior areas more than 1000' from the highway. These adverse effects must be considered in the context of the substantial development and resulting aquatic impacts that will occur in the study area as a result of the highway expansion.

We commend NH DOT for using an expert panel/Delphi process for estimating population and employment growth in the I-93 study area, and we believe this is the best approach to analyzing induced growth of any New England project we have reviewed yet. We believe the panel's predictions are reasonable and credible, and are useful not only to NH DOT in its EIS, but they also will be useful to towns to help them prepare for induced growth from the highway widening. We are concerned, however, about the interpretation of the panel's projections. We believe, for example, that the DEIS inaccurately represents the magnitude of the additional growth by portraying the Build Alternative as leading to only a 5% increase over No-Build. Although true when the increase is compared to the total population in the study area, when comparing Build and No-Build alternatives, the population increase at Build would be 29% greater than at No-Build, and employment growth would be 22% greater. This is a highly populated area that will continue to grow significantly even at No-Build, but in the FEIS, the highway's impacts on growth should not be minimized.

In the DEIS, NH DOT translated these population and employment predictions into acres of land that will be developed to accommodate the growth. Although the method used to calculate acreage is logical, we believe it is an underestimate when compared to recent rates of land development in New Hampshire and Massachusetts, and in New England as a region. For example, a study conducted by the Rockingham Planning Commission showed an accelerating pattern of development, with land consumption rates tripling in 40 years: pre-1953, .45 acres of land per capita were used for new development, while between 1953 and 1974 new development consumed .75 acres per capita, and it accelerated to 1.59 acres per capita between 1974 and 1982 and through 1992. Using information from the US Census Bureau and the National Resources Inventory for New England as a whole, over a recent 15-year period the number of acres developed for every new person more than tripled, from .70 acres (1982-1987) to 1.31 acres (1987-1992) to 2.33 acres in the last period for which data are available (1992-1997). These same data sets show that in New Hampshire and Massachusetts, between 1992 and 1997, 1.04 and 1.74 acres of land were developed for every new person in each of these two states, respectively. If these recent rates of land development are predictive of the future, the amount of

land developed in the I-93 study area by 40,626 additional people could be as much as 42,251 acres (1.04 acres per capita), 64,595 acres (1.59 acres per capita), 70,689 acres (1.74 acres per capita), or 94,658 acres (2.33 acres per capita), instead of the 20,000 acres presented in the DEIS.

Given these recent patterns of an accelerating consumption of land, it is clear that using zoning to predict land development almost certainly underestimates the land use change the highway will induce, particularly in communities with abundant developable land. In most New England towns, zoning is based on minimum acreage for a particular land use (e.g., 2 acre residential zoning), not a maximum acreage. It is reasonable to assume land development rates may continue to accelerate in New England unless communities choose to take actions such as regulating maximum acreage or establishing urban growth boundaries. We recommend that the FEIS include information on recent rates of land development to help inform communities about what their future may look like, with and without a wider highway. The DEIS also makes the point that in areas with large lot zoning, much of a lot may remain undisturbed. What this ignores, however, is the minimal wildlife value of small patches of habitat sandwiched between homes, outbuildings, and lawns, and we recommend the FEIS include this caution.

Our greatest concern with the analysis, however, is with the conclusion that there is sufficient developable land in most of the towns to accommodate the predicted population and employment growth with no environmental impacts. This conclusion is unsupportable, and is based on the flawed assumption that as long as development takes place outside of environmentally sensitive areas (e.g., wetlands), it is impact-free. This ignores well-documented impacts of development, such as runoff from impervious surfaces, reduced groundwater recharge, increased water demand, increased air emissions from vehicles, and many other impacts. It also ignores the well-known impacts of upland development on wetland functions and values, described below. These deficiencies should be addressed in the FEIS.[5]

Impacts to Wildlife and Wildlife Habitat

Habitat destruction and fragmentation are leading causes to the loss of wildlife, and highways are a major contributor to this loss. Roads cover approximately 1% of the landscape in the United States, but larger highways typically cause ecological impacts to a much larger area (10% - 20%) in the "road-effect zone" (Forman 2000). More than 20 ecological effects of roads have been identified, and some of these impacts include: 1) increased mortality from road construction, 2)

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[5] The impacts of this project also should be evaluated in light of current population, which is 605,000 in the 29-town study area in NH and MA, and in light of reasonably foreseeable future growth. The Delphi/expert panel estimated the region would grow to a population of 743,045 in the year 2020 even if the highway is not widened, and to 783,671 if it is widened. It is this "base growth" of 138,045 people at No Build in addition to the 40,626 people at Full Build that leads to our concern about the severity of the environmental impacts of the long term growth induced by the highway expansion. While we may differ about whether the likely number of acres that will be developed is closer to 20,000, 40,000, or 90,000, the effect is both "reasonably foreseeable" and large.

increased mortality from collisions with vehicles, 3) modification of animal behavior, 4) alteration of the nearby physical environment, 5) alteration of the nearby chemical environment, 6) spread of exotic species, and 7) increased alteration and use of habitats by humans (Trombulak and Frissell, 2000).

Road construction not only kills slow-moving animals in the path of the road, but it also compacts the soil and destroys the roots of plants affecting the adjacent natural landscape for many feet on each side of the pavement. Vehicle collisions can greatly reduce animal numbers and isolate populations especially on large high-speed roads with high traffic volumes like I-93. (For example, a study in Canada found during a 2-year period, more than 32,000 amphibians, reptiles, birds, and mammals were killed along one 3-mile section of road (Ashley and Robinson, 1996).) Roads alter animal behavior by noise, predator introduction, changing home ranges, movement options, reproduction choices, and escape response. Highways change soil temperature, light levels, patterns of runoff, and add heavy metals, salts, organics, and nutrients to the environment. Roads also promote the spread of exotic species and add more human access to the environment. Expansion of I-93 will result in all of the adverse impacts described above, and will at least double the effects being caused by the existing road.

The expansion would directly destroy 85 acres of wetlands and adversely affect the diverse and abundant wildlife communities that depend upon these resources. The removal of mast producing vegetation from the road construction work would reduce the available food source for a broad range of wildlife species. Clearing 300 acres for the road would also remove the standing dead trees and snags important to resting, nesting, denning, and feeding habitat for numerous wildlife species. Animals unable to escape areas denuded of vegetation would not survive. More mobile species would attempt to relocate in adjacent areas. However, in all likelihood these nearby habitats are at or near carrying capacity and would not be able to accommodate refugee animals.

An 8-lane roadway would constitute a far greater barrier to animal movements than the existing 4-lane roadway. While increased traffic will contribute to the problem, the key difference is the size and shape of the roadway. The existing road generally consists of approximately 35' of pavement for each of the two lanes and shoulders, separated by more than 100' of trees, shrubs, and other dense vegetation. Animals that cross the first 35' have an area in which to hide or rest before attempting to cross the other 35' of pavement. The typical section of highway proposed for this project would be 250' - 300' of continuous cleared land (Figure 2.3-20 of the DEIS) or the length of a football field, with no refuge until an animal reaches the other side. The 8 lanes of roadway will take up 100' of space while the potential future rail line, road shoulders and adjacent clearing will remove vegetation on the remaining portions. The exposed area will be almost an order of magnitude larger than existing conditions, greatly increasing the risk to wildlife.

Wide-ranging mammal species will lose access to important habitats as their movements are even more restricted by the roadway. As individuals are killed trying to cross the highway or

denied access to critical habitats, local populations will likely fail or be substantially reduced. The DEIS does not address EPA's comments on the Scoping Document which asked NHDOT to investigate underpasses for wildlife movement, especially at existing bridges and streams. Beaver Brook and Cohas Brook are two areas with high potential for wildlife movement at existing bridges. Also, the town of Londonderry has made a similar request near the Stonehenge Bridge upgrade. We continue to believe that NHDOT should investigate underpasses, present a discussion of them in the FEIS, and incorporate appropriate measures into its mitigation plan.

Some of the impacts of I-93 may extend outward small distances (less than 100') including the deposition of heavy metals, microclimatic changes, and small mammal crossings. Other impacts will likely extend out a much further distance such as altered streams and wetland drainage, road salt impacts, exotic species invasion, increase predation by crows, feral cats, racoons and other edge predators, and blocking of movements of far-ranging animals. A study of 20 miles of Route 2 in Massachusetts showed the "road-effect zone" to be: 300' for invasive plants; 300' - 900' for salamander migration routes; 600' - 4,000' for road salt effects; 300' - 1800' for traffic noise on bird communities; and an unknown distance of alteration of movement patterns for far-ranging mammals such as fisher (Forman 2000). The average distance of impacts from the "road-effect zone" exceeded 1800' and these impacts will only be greater for a much larger and busier highway like I-93 which will be twice the size of the example above.

The loss of wetland and forested habitats expected as a result of induced growth would also cause increased habitat fragmentation. This would reduce the total amount of various habitats available in the region and apportion the remaining habitat into smaller, more isolated patches. The adverse impacts of habitat fragmentation due to future development may include local extinctions, creation of barriers to animal movements, and increased edge effects.

Area-Sensitive Birds

A number of area-sensitive species will be affected adversely by the expansion and by projected future development. These species typically require large tracts of land for breeding and generally decline with habitat fragmentation and reductions in forest patch sizes. Because of continued urbanization and fragmentation of natural habitats throughout New England, many area-sensitive species adapted to these larger tracts of land continue to decline in both range and number. Forest-interior birds do not nest or establish nesting territories on forest edges. These species avoid disturbed and non-forested areas at a distance of 30 to 300 feet depending on the species. Further, many of these species breed in a manner which also puts them at greater risk to human induced fragmentation. Such behavior includes nesting only one time during the breeding season and building open nests close to the ground, making the nest vulnerable to predation and parasitism. Increased nest predation and brood parasitism are two of the factors effecting forest bird declines in fragmented landscapes. The breeding success of area-sensitive birds can vary directly with the amount of core area in a forest. As a forest becomes increasingly fragmented, the amount of forest edge increases. This subjects forest-interior birds to higher frequencies of nest predation and brood parasitism, thereby reducing reproductive output (Andren and Anglestam, 1988). The highway expansion will substantially increase the noise compared to the

existing road, adversely affecting birds in the interior portions near the roadway. Traffic noise can impact these species by disrupting bird communication, especially during egg laying and rearing of young, and these impacts can occur as far away as over 1000' from a very busy road such as an expanded I-93.

The project would promote tens of thousands of acres of additional development that will significantly increase the fragmentation of forested habitats in the region. This would not only contribute to loss of forest habitat for migrating, wintering, and breeding birds, but it would also exacerbate current declines in forest bird reproductive success due to increased levels of nest predation and brood parasitism. Further, the regional bird populations may be affected. This is because the large (>1000 acres) contiguous forested tracts in the region probably allow more forest bird species to persist in the smaller isolated tracts (>100 acres) because the larger areas act as a source from which the smaller parcels can be recolonized (Robbins et al., 1989).

Some of the area-sensitive birds that would likely suffer most from the proposed highway and future development include (all these species depend on wetlands or utilize wetlands regularly):

eastern screech owl	great-horned owl	pied-billed grebe
broad-winged hawk	red-shouldered hawk	barred owl
northern waterthrush	pileated woodpecker	black & white warbler
veery	great crested flycatcher	wood thrush
yellow-throated vireo	red-eyed vireo	ovenbird

Neotropical Birds

Future development will fragment wetland and upland complexes and impact the neotropical species which occur in the study area. The highway and future development will remove wetland tree species that provide a food source for a substantial population of herbivorous insects, which in turn are eaten by a diverse population of bird species. This is particularly important for the long-distance migratory species, usually referred to as neotropical migrants, such as the warblers, vireos, and some of the flycatchers and thrushes, which utilize the rich insect fauna characteristic of these ecosystems during critical periods of their migration. (The vast majority of these species utilize wetlands and riparian systems.) The U.S. Fish and Wildlife Service has documented long-term population declines of these species in area of the United States undergoing rapid urbanization.

Mammals

Several wetland-dependent and upland mammal species that range over large areas also will be adversely affected by the fragmentation of wetland, riparian, and forested habitats. For example, the fisher has a large home range in forested areas and commonly uses riparian habitats for hunting. When dispersing, sub-adult and juvenile fisher commonly suffer mortality when crossing highways. Similarly, river otter range widely between different wetland types throughout their annual period. They typically avoid areas with human disturbance and commonly use riparian corridors for travel. Mink, otter, ermine, weasel, moose, bear and fisher

all occur in the study area and are area-sensitive species. As noted above, these species will be adversely affected by the road expansion. The expansion would greatly impact movement patterns of far-ranging mammals since it will be much more difficult for these species to successfully cross the highway. Adverse effects will include the death of animals trying to cross the road, and altered reproductive success and escape options due to animals avoiding the area. This will result in greater genetic isolation on each side of the roadway. They will also suffer from the loss of interior habitat resulting from the expected future development.

Without additional land protection, in several decades subsequent development could eliminate populations of the large carnivores, especially bobcat, fisher, and otter, from many portions of the study area. This will likely result in a cascade effect where smaller, generalist carnivores, well adapted to humans (especially raccoons, skunks, and opossums) are able to respond to the loss of large predators and increase their density. These smaller predators may then inflict greater losses on populations of small mammals, reptiles, amphibians and birds, causing the elimination of some low-density species (Soulé et al., 1988, Brown and Litvaitis, 1995). This middle-sized omnivore amplification has been identified as a critical factor in the demise of many migratory songbirds (Soule et al., 1988, and Harris, 1989).

Reptiles, Amphibians and Small Mammals

The expansion and the induced development would impact most of the amphibian, reptile and small mammal species which regularly use aquatic systems in the study area. The loss of habitat would affect the carrying capacity of the area and would result in decreased abundance for most species. Important habitats for small wildlife species as well as the interspersion of many wetland and upland habitats would be eliminated. The disruption of dispersal pathways will likely threaten local and regional populations over time. Small, less mobile mammals, such as water shrew, northern short-tailed shrew, and southern bog lemming, are the most likely to be lost by the direct destruction of habitat that will occur.

The project will directly destroy at least 4 vernal pools that are valuable to wildlife, particularly as breeding areas for amphibians. The induced growth caused by the highway will likely destroy many more vernal pools. Adult amphibians possess a strong fidelity for breeding sites and rarely disperse to other breeding ponds. Dispersal and colonization of habitats typically occurs in the juvenile life stage. Given their strong fidelity for breeding ponds it is unlikely that populations of amphibians would disperse to other breeding habitat after the loss of their breeding ponds. Researchers have documented instances where breeding adults returned for several years to sites where breeding ponds had been destroyed. Therefore, the loss of vernal pool habitat, as well as other amphibian breeding areas, would likely result in the loss of local populations of several species, including the spotted salamander, wood frog, American toad, Fowler's toad, gray treefrog, spring peeper and the uncommon blue-spotted salamander. The highway and its associated development may fill numerous small wetlands that are important for amphibians, turtles, snakes and small mammals. In particular, several turtle species utilize vernal pools and other wetlands for habitat, including snapping, spotted and Blanding's turtles. The loss of these habitats would adversely affect these species, two of which (spotted turtle and Blanding's turtle)

are considered to be species of special management concern.

The loss of amphibians, reptiles and small mammals would also adversely affect avian and mammalian communities. These animals are important links in both aquatic and terrestrial food webs. Amphibians constitute a significant amount of biomass and are therefore critical components for supporting higher trophic levels. For example, herons, egrets, raptors, raccoons and other mammals, and snakes eat frogs and salamanders. Snakes in turn are eaten by large wading birds, raptors, and furbearers. These complex food webs also play a critical role in transferring energy from wetland to upland systems. Small mammals, such as mice, voles, and shrews, are important prey for foxes, coyotes, minks, weasels, fishers, and bobcats, as well as a variety of hawks and owls. As populations of small animals are lost or diminished, the capacity of the area to support a vast array of wildlife species would be markedly reduced.

Hydrological Impacts

The highway expansion will destroy wetlands which purify water. Greater amounts of sediment, nutrients, and other pollutants of urban runoff, such as lead, oil, and gas, will enter tributary streams. Sediment causes turbidity, which reduces aquatic life and usually transports pesticides, heavy metals and other toxins into the streams. Additionally, as the highway will promote the development of thousands of acres of land, much of the natural vegetation will be replaced by impervious surfaces which, in combination with increased sources of pollutants from residential and commercial development will substantially increase non-point source pollutant loading to nearby streams and aquifers. Such development will also destroy wetlands that would otherwise remove some this runoff of urban pollutants by storing and transforming chemicals such as nitrogen.

The proposed highway and associated development will also fill wetlands that reduce peak flood levels, and often augment stream flows and groundwater aquifers. Many of the wetland systems in the study area are closely aligned with large underground drinking water supplies. Wetland losses in this area would not only reduce the ability of the wetlands to reduce the levels of pollution reaching drinking water supplies, but also reduce the groundwater recharge and discharge interactions between wetlands and aquifers.

Road Salt and its Impacts on Water Quality

As described below, the information contained in the DEIS on road salt is inadequate for EPA to assess whether the project would comply with the New Hampshire water quality criteria for chloride, New Hampshire's antidegradation statute for surface water quality, or with the national secondary drinking water standards. The New Hampshire Surface Water Quality Regulations, Env-Ws 1700, have established acute and chronic aquatic life criteria for chloride associated with sodium as 860 and 230 mg/l, respectively. The national and state secondary drinking water standard for chloride, Env-Ws 319.01, is 250 mg/l. The DEIS states in this section [page 4-29] that: "excessive levels of sodium chloride can have detrimental effects on freshwater organisms by disrupting their osmotic balance." It also states that: "none of the sodium and chloride is attenuated within the road side soils or proposed treatment measures." Therefore, the proposed

detention basins and grassy swales will have little or no effect on deicing salt contamination. In addition, the NH Surface Water Quality Antidegradation provision, Env-Ws 1708(a), states that "existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected."

The DEIS states on page 4-29 that "on average, road salt is applied at an annual rate of 21 tons per lane-mile on major highways." Therefore, for an eight-lane highway that is 19.8 miles long, average road salt loading will be 3,326 tons per year. This figure does not take into consideration additional loadings from secondary roads or interchanges in the watershed drainage areas. Nor does it represent a worst-case analysis for those years when salt loadings may exceed the estimated level.

Table 4.4-3 on page 4-40 presents estimated chloride loadings on the 21 water bodies potentially impacted by I-93, both existing and projected. These concentrations are based on a mass-balance model factoring in the average chloride application rate (21 tons/lane-mile/year), average recharge rate (1.7 cfs/mile^2) and drainage areas. Using this model, the DEIS concludes that "none of the projected average annual chloride concentrations exceed the acute [sic] aquatic life standard and secondary drinking water standard of 230 and 250 mg/l, respectively." EPA disagrees with this conclusion and believes that this road salt mass-balance modeling is significantly flawed for the following reasons:

1. The annual average loading estimate per lane-mile used in the model is unsubstantiated in the DEIS. The cited reference [NHDOT, 2002] could not be found in the reference section. No data is given to support the estimate from actual NHDOT application records on this stretch of I-93 or similarly-sized roads in New Hampshire.

2. The estimated annual loading is given only as an average value; a worst-case value should be used if sensitive fauna and drinking water resources are to be protected during and after severe winters when deicing-chemical applications are likely to be higher.

3. No on-site water quality monitoring data are provided to calibrate or verify the model's results. What are upstream and downstream chloride levels in these lakes, ponds, rivers and streams following the spring melt period? What are the current deicing salt impacts on these water bodies from secondary roads and interchanges, as well as from commercial, industrial and residential land uses in the I-93 corridor? Were impacts from projected secondary development up to the year 2020 incorporated in the simulation? In the absence of this information, the DEIS's predictions of non-exceedance cannot be substantiated. While the DEIS acknowledges on page 4-41 in its summary section that "all of the identified streams and rivers are currently affected to some degree by highway runoff from I-93 as well as other roadways and developed areas," the actual effects are not specified. In addition, the DEIS mentions on page 4-39 that the UNH Biology Group obtained high conductivity measurements in the inlet cove downstream of the north tributary to Canobie Lake in 1994, but gives no further details or more recent information other to say that "high conductivity readings are generally indicative of high sodium

and chloride ions in the water column."

A notable example of the effects of I-93 stormwater runoff and its serious degradation of water quality is Stevens Pond in Manchester. According to the *Year 2 Report, May 2002, Manchester Urban Ponds* published by the Manchester Urban Pond Restoration Program, "Stevens Pond has been severely impacted by development. Eutrophication is being accelerated by [I-93] highway runoff. Chloride and sodium levels are among the highest ever recorded in a freshwater body in New Hampshire." The pond has also become more salty over time. In July of 1981, conductivity was measured at 301 uS/cm, 696 uS/cm in July 1997, and the mean in 2001 was 1148.8 uS/cm. Hypolimnion levels have been detected as high as 2220 uS/cm due to the resulting stratification contributed by deicing salt runoff [ibid., p. 30]. The average conductivity for NH lakes is 56.8 uS/cm [ibid., p. 7].

4. The DEIS states on page 2-101, Environmental Consequences: "From a surface water quality standpoint, the Three-Lane Alternative with the proposed treatment measures will result in 19 of the 21 streams having lower or no net increase in pollutant loading with two streams showing a slight increase as compared to today's conditions. In comparison, with the Four-Lane Alternative, 17 streams will show lower or no net increase in pollutant loading with four streams showing a slight increase. The new park and ride facilities at Exits 2, 3 and 5 would have only minor effects on surface water quality."

Because today's conditions are not defined by on-site data, it is difficult to compare this with any impacts from future treatment measures. Pollutant loadings may be already resulting in local exceedances of water-quality standards for chloride, and the proposed mitigating measures for an expanded highway may not be effective enough to abate continued degradation over time. Annual winter salt loadings since NHDOT applications began many years ago have already likely affected surface and ground water quality. For example, NHDES water-quality data for Canobie Lake and Cobbetts Pond show increases in conductivity and chloride levels in the last 25 years from 1976 to 2001. In Canobie Lake, these concentrations were 158 uS/cm and 31 mg/l in August 1976, 192.8 uS/cm and 41 mg/l in March 1988, and 251 uS/cm and 60 mg/l, respectively, in January 2001. In Cobbetts Pond, conductivity and chloride levels were 200 uS/cm and 40 mg/l in July 1976, 286.8 uS/cm and 62 mg/l in March 1987, and a mean conductivity of 350.5 uS/cm was measured in 2000 [Jody Connor, NHDES, personal communication, November, 2002]. Increases in salinity in lakes tends to foster the development of anoxic zones at depth from density effects with reduced circulation of dissolved oxygen, followed by increased mobilization of nutrients and metals from sediments into the water column.

Because the DEIS contains no water quality data for streams upstream and downstream of the I-93 corridor, "today's conditions" for these resources are not described. In addition, no baseline data is available in the DEIS to allow for future assessment of water-quality impacts following highway and BMP construction. A monitoring program is proposed below to address this issue.

5. Ground water resources are described in Section 4.4.3, beginning on page 4-51 of the DEIS. It

includes an "evaluation of the potential long-term average annual sodium and chloride concentrations in ground water at the downgradient edge of the right-of-way." It also discusses the location and impacts on the wellhead protection areas of 14 public water supply wells along the I-93 corridor. Similar to the approach used for surface water, a mass-balance model for ground water was developed to simulate average sodium and chloride levels in stratified drift and till aquifers. However, the model and its results have several problems, as follows:

1. Median background concentrations of sodium and chloride in ground water flowing below the 300- 400 feet wide infiltration zone were assumed to be 10 and 19.5 mg/l, respectively, based on a 1992 report.[6] Page 62 of the report provides a statistical summary of analyses from the 30 observation wells used in the report. Of these 30, only 5 wells are in towns crossed by I-93: wells SAW 49 and 59 in Salem, and WPW 37, 38, and 258 in Windham. The closest wells range in distance from approximately 8,500 feet (1.6 miles) to 15,500 feet (2.9 miles) from I-93. EPA believes that the large distance of these wells from I-93 and the small number of wells sampled precludes meaningful statistical evaluation of aquifer background levels for the mass-balance model. In addition, according to the supplemental data report for the USGS study (Flanagan and Stekl, 1992, *OFR 89-390*, p. 117), all 30 of the wells were sampled only once in 1987, or fifteen years ago. EPA believes that not only should more wells in the I-93 area be sampled (both observation and public supply wells) for statistical validity, but that well sampling should be much more recent than 1987, and therefore more representative of current background conditions.

2. Other model assumptions described on page 4-53 of the DEIS are unsubstantiated. For example, estimated ground water velocities assigned to stratified drift and till which vary from 10 to 1.25 feet per day, respectively, are excessive given the low hydraulic gradients that exist along the infiltration zone. The DEIS states that these values were based on typical hydraulic conductivity, slope and porosity data given in the USGS reports above, but these are not site-specific estimates. EPA believes that NHDOT should describe how model assumptions and estimates were derived, and explain why these values are the most appropriate to use absent any other available information. The I-93 corridor has both residential and public water supplies for which more recent water quality analyses have been performed, and these should be used in the mass-balance model, not monitoring wells located miles away and sampled 15 years ago. For example, a telephone call by EPA to the Pennichuck Water Works resulted in obtaining recent sodium and chloride analyses performed for its W&E wellfield next to Canobie Lake. The wellfield has three bedrock wells: numbered 3, 4 and 5. Well 3 had a chloride level of 333 mg/l measured last year on November 2, 2001, much higher than the 19.5 mg/l concentration used in the NHDOT mass- balance model described on page 4-53 (personal communication: Gary

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[6] Stekl, Peter J. and Flanagan, Sarah M., 1992, "Geohydrology and Water Quality of Stratified - Drift Aquifers in the Lower Merrimack and Coastal River Basins, Southeastern New Hampshire": U. S. Geological Survey WRIR 91-4025, 75 p.

Tetley, PWW Laboratory, 10/30/02).

The U. S. Geological Survey recently published a detailed study of road salt pollution impacts from a four-lane highway in Wareham, Massachusetts.[7] One of the findings of the study is that specific conductance of highway runoff ranged from 37 to 51,000 uS/cm in the 233 discrete samples obtained from 1988 to 1995 and from 2.69 to 63,275 uS/cm using continuous datalogging devices. In contrast, the conductivity of regional precipitation ranged from 2 to 195 uS/cm, and about 50 to 1,500 uS/cm for potable water. The report also supports the idea that the relative molal concentrations of sodium, calcium and chloride can be derived from conductivity data. Also, an important conclusion of the study was that only real-time (continuous) recording of runoff quality can adequately represent the large fluctuations of conductivity and provide the context needed to interpret analyses of water-quality samples.

Recommendations for Road Salt Impact Assessment

In order to better quantify actual current impacts from road salt application on sensitive surface water and drinking water resources, and to create a more accurate mass-balance model for impact predictions, EPA strongly recommends that the following tasks occur during the 2002-2003 winter/spring season:

1. Maintain an accurate tally (to the nearest ton) of total road salt tonnage applied from December, 2002 to April, 2003 on I-93 and its interchange ramps from the Massachusetts/New Hampshire border to the I-293 interchange.

2. As soon as practicable, install 13 electrical conductance dataloggers at the following perennial surface-water bodies (numbers are those given in Figure 3.4-1, Surface Waters): Spickett River at Hampshire Road, Harris Brook at Hampshire Road, 77N: Policy Brook at Salem Rest Area, 70N: Porcupine Brook at NH 38 (Lowell Road), 56N: North tributary to Canobie Lake at West Shore Road, Canobie Lake Hypolimnion, Northeast Tributary to Cobbetts Pond at Exit 3 - Dinsmore Brook, Cobbetts Pond Hypolimnion, 42N: Mitchell Pond Brook at Morrison Road, 33S: Beaver Brook at Bob Early Bridge on Gilcreast Road, Wheeler Pond at Exit 4,19N: Tributary to Hoods Brook at Rte. 28 (Rockingham Road), 4E, Cohas Brook at Bodwell Road Bridge.

The measurement interval should be once per hour. Datalogger probes should be installed in stilling wells set in the channel bottom to intercept flowing water under the ice. Specific monitoring guidelines and procedures can be determined once the program has been reviewed by NHDOT and the EPA.

In addition, beginning in December 2002, monthly samples for sodium and chloride and

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[7] Granato, Gregory E. and Smith, Kirk P., 1999, "Estimating Concentrations of Road-Salt Constituents in Highway-Runoff from Measurements of Specific Conductance": U. S. Geological Survey WRIR 99-4077, 22 p.

electrical conductance should be obtained from the surface water locations listed above and from the pre- treated source water of Pennichuck W&E Public Supply Wells 3, 4 and 5 (with the owner's permission) to create a database of background levels of these parameters and to calibrate datalogger measurements. The rationale for this recommendation is that because the NHDOT mass-balance model does not take into consideration current background concentrations of these parameters, it is likely to underestimate impacts to sensitive aquatic species in the project area or project potential exceedances of acute or chronic chloride standards cited in Env-Ws 1703.21(a) and (b). On-site deicing salt loading data and measurements in surface water bodies will also provide essential calibration controls for NHDOT mass-balance modeling simulations.

Available historical data for sodium, chloride and electrical conductance at the other public supply wells listed on Table 4.4-8 of the DEIS and in Canobie Lake and Cobbetts Pond should be compiled for statistical trend analysis. EPA recommends that NHDOT contact the NHDES and watershed monitoring groups for this information. For example, water-quality monitoring data for Cobbetts Pond from 1988 to 2000 may be accessed at:

http://www.des.state.nh.us/wmb/vlap/2000/cobbettspond.pdf

In summary, EPA believes there is a high potential for road salt applications on the widened highway to have serious impacts on water quality, and to impair drinking water supplies along the corridor. Therefore, we believe it would be prudent for NHDOT to incorporate measures to protect drinking water supplies in the study area into the proposed mitigation package.

Alternatives

As noted previously, NEPA requires that Environmental Impact Statements contain a discussion of a full range of alternatives. To comply with the alternatives test of the § 404(b)(1) guidelines (40 C.F.R. § 230.10 (a)), NHDOT must demonstrate that its preferred alternative is the least environmentally damaging practicable alternative ("LEDPA"). In this case, we agree that the LEDPA may be drawn from among the highway expansion alternatives. We have not reached a firm conclusion as to whether the 3 lane or 4 lane alternative is the LEDPA. Our primary concerns with the project relate to impacts associated with either alternative in light of the substantial impacts that will occur in the study area. (Alternatives are discussed here; see section below regarding avoidance, minimization, and compensatory mitigation.)

NHDOT's preferred alternative entails widening I-93 to 4 lanes in each direction, in combination with other infrastructure improvements and strategies. Even if such an expansion is shown to be the LEDPA, EPA believes that a long-term solution to traffic congestion on the highway must include alternatives to single occupancy vehicle travel, such as rail, that are not influenced by highway construction or accidents. We also believe it is wise to invest in Transportation System Management (TSM), and Transportation Demand Management (TDM) improvements in order to preserve the capacity of the highway and make the system function efficiently. Although we

believe the preferred alternative contains some valuable commitments to TSM and TDM, we are concerned about NHDOT's commitment to a broader suite of transit improvements in the corridor, as described below.

Transit

Based on the *Rail Alternatives Evaluation Report* and the *Rationale Report*, NHDOT decided not to carry an alternative that includes rail into the DEIS, although the DEIS shows a commitment to not taking any action that would preclude rail in the future. EPA understands that neither transit nor HOV lanes alone are sufficient to solve the congestion and safety problems in the corridor, but we strongly believe that the most effective transportation solution is a multi-modal system, and we support NHDOT's position that future capacity needs will have to be served by other modes of transportation. During interagency coordination meetings prior to publication of the DEIS, NHDOT proposed dropping rail as an alternative in the DEIS, and EPA concurred with this proposal so long as there was a binding Memorandum of Agreement (MOA) committing NHDOT to conducting a transit study with the Massachusetts Executive Office of Transportation and Construction (MA EOTC), and then working to implement a functioning transit system in the corridor in a timely way. This bi-state study, as envisioned, will evaluate transit alternatives, including rail, between Boston and Manchester, NH, and build upon the foundation laid by NHDOT's *Rail Alternatives Evaluation Report*. All parties agreed that the MOA would be signed not just by the Commissioner of NHDOT and Secretary of MA EOTC, but also by the entire I-93 Board of Directors. We continue to strongly urge NHDOT to work promptly with the Board of Directors to develop and sign such an MOA. The FEIS should incorporate this binding agreement, and a firm, detailed schedule for the study as well as subsequent steps towards implementing the preferred transit alternative.

When the bistate transit study is undertaken, the rail ridership numbers should be reevaluated. We believe the ridership numbers in the *Rationale Report* may be underestimated for reasons described in more detail in our March 12, 2001 letter to NHDOT. In addition, we support a recommendation of the Salem-Plaistow-Windham Metropolitan Planning Organization that in light of new information from the Merrimack Valley Planning Commission, NHDOT should reevaluate the utility of an HOV lane from NH down to the intersection with Rt. 495. Although we believe this reevaluation should take place sooner rather than later and be incorporated into the FEIS, as long as room for an HOV lane is part of the preferred alternative, the reevaluation could be incorporated into the bistate transit study that is scheduled to begin in 2003. In fact, there may be some logic to deferring the analysis of an HOV lane until the bistate transit study, since the lane will only function effectively if it continues into Massachusetts, and this requires the participation of the Commonwealth of Massachusetts.

Park and Ride Lots

The availability of abundant and convenient parking at park and ride lots is essential to any effort to encourage commuters to use bus transportation into Massachusetts. The existing DEIS includes a description of existing services and proposed new services. The existing services range from transportation management associations that provide commuter benefits to employers

and employees along the corridor to bus service offered by Concord Trailways. As demonstrated by the growth in passenger volume on Concord Trailways between 1990 and 1999 (from 316,337 to 672,764 passengers per year), there is clearly a market for reliable and convenient commuter bus service. These services should continue to expand in the coming years, encouraging additional commuters to leave their cars behind for some, or all, of their commute. These services will help reduce traffic volumes and associated air pollution along the segment of the highway that is to be widened and will also help reduce traffic congestion in the Massachusetts portion of the road. The FEIS should include a comprehensive plan for how these services will be better managed and coordinated, to ensure that they continue to make a meaningful contribution to addressing congestion in this corridor over the long term.

The DEIS mentions plans for expanded bus service and the addition of three new park and ride lots at Exits 2, 3 and 5. Bus service facilities also would be planned for these lots. The description in the preferred alternative section of the EIS does not specify how many parking spaces each lot would have. However, the TDM alternative provides numbers of parking spaces for each lot, and these are listed below. EPA recommends that the FEIS confirm these to be the parking space numbers – or provide other numbers – for the demand management strategies of the preferred alternative, and that the FEIS include a timeline for the construction of these park and ride facilities.

Exit 2: 430 spaces
Exit 3: 525 spaces
Exit 5: 500 spaces

In addition, in order to maximize the use of the facility, these lots should be planned so that they can later complement rail service.

Expanded Commuter Bus Service

In the preferred alternative, the NHDOT commits to early construction of the park and ride facilities and implementation of additional bus service, so that these services will be available to commuters while highway construction is underway. Specifically, new bus service will be provided from new park and ride lots at exits 2, 3 and 5. Additional service will operate from the existing park and ride lot at Exit 4. These buses will provide service both to downtown Boston and to employment centers in northern Massachusetts. The DEIS does not clarify the specifics of the service to northern Massachusetts, stating only that it is likely to be two additional routes, to the Lowell Junction Area. As stated previously, a portion of the cars using I-93 in southern New Hampshire will continue into (or come from) Massachusetts. Effective transit alternatives, including buses to employment centers in northern Massachusetts are essential to any strategy to reduce traffic congestion and air pollution.

Intelligent Transportation Systems Technologies and Incident Management Strategies

EPA strongly supports the commitment in the DEIS to expand bus services, and to do so early in the project so that these alternatives are available while the construction is underway. Not only

will this help divert cars from the road during construction, thereby reducing air pollution impacts during construction, but the availability of commuter bus service early will encourage commuters to get into the habit of using bus transportation, thereby reducing commuter traffic congestion once the road is built. The FEIS should provide clear information about specific routes and daily schedules for the bus services that the DOT is committed to providing.

The technologies NHDOT proposes include variable message boards, highway advisory radio broadcasts, web site information, emergency reference markers, and coordination among safety agencies. Such systems will help reduce the impact and length of incident-related traffic congestion.

Bicycle Path

NH DOT proposes to proceed with elements of a bike path along the I-93 corridor consistent with objectives for north-south bike routes between Salem and Concord. The proposal tentatively involves connecting park and ride lots with local roads and the state's regional bike network. EPA supports the inclusion of the bike path in the project scope, since it provides an alternative mode for commuters and others traveling in the corridor. However, in order to ensure that the bike path really will be used by riders, it is important that its design and access points be bicycle friendly. This means building the path of an appropriate width, using pavement markings, white lane lines, preferential lane symbols, word messages, and bicycle symbols. Since traffic moving at highway speeds is too fast to be compatible with safe bicycling, the path needs to be located a safe distance from the highway, accessible through local roads only.

Measures to Avoid, Minimize, and Compensate for Significant Impacts under the Section 404(b)(1) Guidelines

NHDOT's Proposal

NHDOT has proposed to mitigate project impacts through the protection of 650 - 750 acres of land in five towns bordering the I-93 expansion area, including 15 - 22.7 acres of wetland creation, and technical assistance to towns where the project will stimulate significant population growth.[8] Many of the sites NHDOT selected are important to the five towns for a variety of reasons, such as flood storage, treating storm water run-off from I-93, and local aesthetics. EPA supports these items as part of a larger approach to comply with the Guidelines.

Two of the areas that NHDOT has selected for preservation have good potential ecological value based on their location--Southeast Lands (250 acres) and South Road (75 acres with some restoration). Southeast Lands is part of EPA's suggested list described below (although we recommended acquiring a much larger and ecologically sustainable amount of land; 900 acres), and South Road lies adjacent to Beaver Brook, a natural stream corridor. Nevertheless, both

[8] The DEIS talks about 22.7 acres of wetland creation or restoration, but EPA is only aware of 15 acres of creation. If the Crystal Lake sites are selected in Manchester, it will increase the total an additional 80 - 100 acres.

these sites have ecological drawbacks associated with existing and potential opportunities for development. In particular, there is very little land currently protected near the Southeast Lands area. Consequently, the 250 acre parcel proposed by NHDOT could lose ecological value over time if development surrounds the area and it ultimately functions ecologically more like an island. South Road has considerable development nearby and a road bisects the parcel.

The other NHDOT-proposed preservation sites are less desirable from an ecological perspective because they are small (less than 30 acres), near development, isolated from other protected lands, and fail to sufficiently address the substantial direct and indirect adverse effects of the expansion. . In addition, these parcels would do little to avoid the foreseeable development effects discussed previously in these comments, such as the fragmentation of remaining habitat blocks in the study area. Over the next 20 - 30 years, the vast majority of these sites will become islands of habitat, cut off from other open space parcels and of little value for drinking water protection or habitat for uncommon and area sensitive species. These small fragmented parcels are the least valuable for protection ecologically , and therefore constitute inadequate mitigation for the project's impacts. In other words, NHDOT's proposal will result in little long-term protection for the most important and most threatened resource: large unfragmented habitat blocks containing aquatic resources, especially streams, drinking water, vernal pools and ponds, which we believe are key factors determining the value of protected areas in preventing aquatic resource damage (see below). Of the 25 high priority open space sites and the 40 unfragmented habitat blocks identified in the NH Audubon Study, only the two NHDOT sites mentioned above provide some benefits to these key regional natural resources and wetlands. Moreover, there are no NHDOT sites that expand, link or connect currently protected lands--the most cost effective way to limit fragmentation.

NHDOT's mitigation proposal also includes a technical assistance program in which they would work with the Office of State Planning, Regional Planning Commissions, and others to provide technical assistance to the NH communities in the study area to help them address potential future growth,. EPA believes this technical assistance program is an innovative proposal that will help communities in the I-93 study area manage land use in a manner that wisely accommodates the growth the highway is predicted to bring. While we support this program, we believe that the FEIS should describe how it will enable communities to better protect wetlands and other natural resources.

<u>EPA's Recommendation</u>

EPA's concept of adequately addressing the project impacts includes all of the elements in NHDOT's plan plus funds for a local land protection grant program, protection of additional large land parcels needed to protect ecological integrity and/or drinking water supplies, and introduction of wildlife passages. This concept is consistent with and expands slightly on the recommendations contained in our September 5, 2002 letter to NHDOT and developed in conjunction with NH Fish & Game Department, NH Department of Environmental Services, and the US Fish & Wildlife Service. The specific areas these agencies recommend protecting have been identified by a wide range of New Hampshire organizations, including NH Audubon, UNH

Cooperative Extension, Conservation Commissions in towns in the I-93 corridor, and many others.

The Guidelines at 40 C.F.R. § 230.10(c) prohibit issuance of a permit when it would result in impacts that either cause or contribute to significant degradation of the aquatic environment. In the case of I-93, the impacts from the expansion will be severe and will contribute to significant degradation of the aquatic ecosystem. Unless the overall impacts are reduced to below this level, the project, as proposed, will not comply with the Guidelines.

We believe one of the most effective and practicable ways for NHDOT to reduce impacts to an acceptable level is to implement measures, such as the preservation of key sensitive areas, to prevent certain impacts from occurring in the first place. As a result of such an approach, the impacts from the highway expansion would be reduced to an acceptable level.

Specifically, we recommend five components that incorporate and build upon the NHDOT proposal: 1) NHDOT's land preservation plans in the 5 corridor towns; 2) lands that help protect or connect large areas; 3) local grants for open space protection in communities impacted by the widening of I-93; 4) NHDOT's technical assistance for smart growth planning in the communities, and 5) incorporation of several wildlife passages throughout the corridor. These elements are described below:

1) Parcels within the 5 corridor towns (650 - 750 acres). As stated above, we recognize the value of including these parcels as part of mitigation. This land preservation includes 15-22.7 acres of wetland creation.

2) Recommended additional parcels to reduce project impacts below the level of significant degradation (2600 acres)[9]. The parcels listed below help link larger ecological blocks and/or drinking water supply lands that are currently protected.[10] The first four parcels on the list provide valuable protection for the Lake Massabesic water supply. We recommend that NHDOT protect all of the parcels below to reduce project impacts.

1) Dubes Pond and Hinman Pond (Hooksett) (700 acres)
2) Connection between Lake Massabesic and Little Lake Massabesic (Auburn) (200 acres)
3) Connection between Spruce Swamp and Little Lake Massabesic (Auburn) (300 acres)
4) Buffer area between Lake Massabesic and Bypass 28 (Auburn) (150 acres)
5) Lands currently owned by Manchester Water Works (additional permanent protection through conservation easement or restriction)
6) Southeast Lands (Windham) (900 acres)

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[9] The size (acres) is an approximation, but the parcels total 2600 acres if the 250 acre Southeast Lands parcel from the NHDOT proposal is subtracted.

[10] See EPA's September 5, 2002 letter for details.

7) Hackett Hill (Manchester) (100 acres, not including the City's proposed industrial park)
8) Land near Musquash Swamp (Londonderry) (250 acres)
9) Ballard Pond (Derry) (250 acres)

3) Land Conservation Grants to Impacted Communities. We believe the NHDOT mitigation plan should include funds for local land protection. These monies would provide an opportunity for all NH towns with high projected growth due to the highway to compete for funds for land protection. As part of the plan, the resource agencies, in coordination with the FHWA and NHDOT, would develop criteria for projects eligible to receive these funds in order to ensure that high quality aquatic resources and water supplies are protected. The parcels would be selected by local towns, with help from the technical assistance portion of the package (#4 below). Through matching funds, the monies will help buy far more land than the towns could otherwise afford. These monies could be handled through a Partnership similar to the Great Bay Partnership, or through a land trust or the existing Land and Community Heritage Investment Program (LCHIP). If established, the funding program would be used over the next 5 - 10 years to protect key parcels in the many southern New Hampshire towns which will be impacted by the development induced by the I-93 widening project.

4) Technical Assistance to Towns. As noted above, EPA strongly supports the technical assistance program proposed by NHDOT, although we suggest a greater emphasis on using the assistance to help towns better protect natural resources.

5) Incorporation of Wildlife Passages Along the Expanded Road. In EPA's comments on the Scoping Report (Aug. 2000), we asked that the DEIS study wildlife tunnels and overpasses. The DEIS indicates that NHDOT will examine the possibility of extending an existing culvert(s) later in the process, presumably after a permit has been issued, when NHDOT will do more engineering work. Given the severe impacts to wildlife explained above, especially to wildlife movement, it is essential that these wildlife corridors be examined and planned during the EIS and 404 permit process. While existing stream crossings are likely candidates for such effort, several locations should be examined including locating areas where animals are currently crossing the road. We recommend that NHDOT's consultant, perhaps with the help of NH F&G, look for winter tracks in the snow this winter to assist in determining appropriate locations for these crossings. The FEIS should incorporate the results of the evaluations and an identification of the appropriate passages that will be incorporated into the project.

Analysis of Mitigation

Supplementing NHDOT's mitigation proposal with the recommendations listed above (or comparable measures) would address many of the concerns about the project by reducing impacts below the threshold for significant degradation. These areas are of particular interest because they will link, connect and expand some of the large, unfragmented habitat blocks containing aquatic resources in the study area. Almost all of the specific sites we recommend are contained in or are adjacent to protected lands. Further, EPA's specific recommendations in item 2 above are of great importance as they help protect portions of 7 of the 25 high priority parcels identified

in the NH Audubon Study; are part of an unfragmented block of over 1000 acres; connect large protected blocks; and expand protections of sensitive areas that are now only partially protected.

Our suggestions for land preservation target high value areas and leverage the ecological and environmental value of lands that are already protected. In some cases protecting a few hundred acres can provide a corridor between two other large protected areas, resulting in a total protected area of over 1,000 acres and safeguarding drinking water supplies at the same time. For example, drinking water supplies at Lake Massabesic will be better protected by adding over 1000 acres of buffer along key streams, ponds, and Lake Massabesic itself; provide open space corridors between the various water supply properties; link the water supply lands to Bear Brook State Park; and help protect a few of the remaining unfragmented habitats remaining in the study area. These large connected parcels would protect a large drinking water supply and act as a refuge for a good portion of the study area, allowing area-sensitive animals to migrate to and re-colonize nearby smaller patches. While it is true that protecting the areas that we suggest will only represent a portion of the work necessary to guard important ecological functions and water supplies in the study area, we know with some certainty that these measures will protect key aquatic systems with links to other valuable areas – the result being a larger network of protected resources.

EPA also supports the technical assistance proposed as part of NHDOT's mitigation efforts. Our August 11, 2002 comments on the scoping document asked NHDOT to provide both technical help for towns and direct protection of key parcels. We have consistently held that position on this topic for several years. We hope the technical assistance and the local grant process can help protect some additional key parcels in the study area. Indeed, the technical assistance portion of NHDOT's mitigation plan has the potential to affect even more acreage than EPA's specific recommendations. However, because it is a voluntary program and the local towns are not obligated to participate or to protect particular areas, there is no certainty that protection of high quality aquatic resources will occur. Further, there is little evidence, based on past land use history and current laws, to suggest that local planning and zoning efforts will adequately protect most of the key wetland and drinking water blocks in the study area.

Mitigation Measures for Surface Water and Drinking Water Supply Wells

As described in Section 3.4, there are approximately 21 rivers and streams along the 20-mile length of the I-93 project area that are and potentially will be impacted by storm water runoff containing metals, sediment, hydrocarbons, nutrients, as well as chloride discussed above. The largest rivers are Spickett River, Beaver Brook and Cohas Brook. The largest lakes are Canobie Lake (a Class A water supply) and Cobbetts Pond. Several other ponds are less than 10 acres in size, but also potentially affected by polluted runoff during storm events.

NHDOT is proposing the use of detention basins and grassy swales to remove storm water constituents. EPA maintains that a more detailed drainage analysis will have to be performed as part of the final design process. This should comprise not only the main stem of I-93, but also interchanges, park and ride facilities, bike path, and secondary roadways in the study area. This

analysis should also incorporate the spill protection measures described in the NHDES guidance *Recommendations for Groundwater Protection Measures for Siting or Improving Roadways.*

Like rivers, streams, lakes and ponds, drinking water supply wells in the I-93 study area also will be impacted by highway expansion and predicted growth. At least 16 public water supply wells utilize ground water to serve local populations. Where applicable, NHDOT should implement Level 3 and Level 4 Best Management Practices (DEIS, Table 4.4-5) such as: diversion of storm water runoff out of sensitive well buffer zones, closed drainage systems, higher guard rails to minimize truck rollovers, extended detention basins, lined grassy swales and snow storage areas, reduced salt applications, and emergency response procedures for local and state officials. If the drinking water quality of a supply well is found to be degraded below acceptable standards due to I-93 activities and related runoff, then NHDOT should remediate or replace the damaged well in accordance with RSA 228:34, and other mitigation measures may need to be developed.

Summary Regarding Aquatic Impacts

We conclude that the impacts of the proposed project, as evaluated under NEPA and CWA section 404, are significant and therefore fail to meet the criteria for permit approval. We reach this conclusion after examining the quality and quantity of the affected aquatic habitat, the substantial adverse impacts that would result from the project in the context of the severe aquatic impacts that are reasonably forseeable from future growth in the study area, the persistence of the impacts, and the difficulty of compensating for the lost habitat values.

The direct and indirect impacts associated with the irretrievable loss of 85 acres of wetland is key to our determination that this project would clearly contribute to significant degradation within the meaning of the section 404(b)(1) Guidelines. This loss will occur in the context of widespread aquatic impacts associated with future development in at least 29 towns, as documented in the NEPA analysis, a substantial portion of which is expected as a result of the highway expansion. The wetlands at risk currently are not degraded or otherwise incapable of functioning normally. In fact, the wetlands and the large habitat blocks that they are part of provide, to varying degrees, the complete range of expected values including flood control, water quality renovation, groundwater discharge and wildlife habitat.

Although the project would degrade the aquatic environment in a number of ways, in these comments we have focused on the impacts to wildlife habitat and water quality. There would be a major loss of special aquatic sites. These impacts would include death and displacement of wildlife, impacts to existing and future drinking water supply, disruption of travel corridors and loss of aquatic habitat. The wildlife community that remains could be reduced in both number of individuals and diversity of species.

We have analyzed the significance of the impact in light of NHDOT's proposed mitigation . However, this proposal alone will not reduce the total project impacts below the significance threshold because of the extent and value of the resources impacted, the relative low ecological

value of NHDOT proposed sites, and the difficulty of compensating for aquatic resource impacts caused by habitat fragmentation.

Air Quality

EPA is unable to independently evaluate the potential air quality impacts of the proposed preferred widening of I-93, or any of the project alternatives, as mesoscale air quality analyses were not prepared as part of the DEIS. Our scoping comments for the DEIS recommended that the air quality impacts of all project alternatives be disclosed so an informed decision can be made with respect to future air quality impacts. We continue to believe that such an analysis should be performed using EPA's MOBILE6 emission factor model, which is the most accurate methodology currently available. A mesoscale analysis addressing volatile organic compounds (VOC) and nitrogen oxide (NOx) emissions associated with the individual alternatives, including the no build or no action alternative, for existing and future years would allow the public and decision makers the opportunity to evaluate alternative specific differences in emitted VOC and NOx motor vehicle emissions, and consider how these emission differences could affect future transportation conformity determinations.

By not considering the motor vehicle emission burdens associated with each alternative at the environmental impact statement stage, the State of New Hampshire has limited its ability to pass conformity for future transportation plans. In the future, the State of New Hampshire may have to select regional emission control strategies, or motor vehicle control strategies in order to satisfy transportation conformity tests.

Also, the Transportation Conformity Rule requires that all FHWA projects in carbon monoxide non-attainment or maintenance areas satisfy the carbon monoxide hot spot test required by 40 C.F.R. 93.116(a) [Please see EPA's Transportation Conformity Rule, 40 C.F.R. 93.109(d)(1)]. EPA has requested a copy of the microscale carbon monoxide analysis prepared for the I-93 Project, including the CAL3QHC and MOBILE5b technical input and output data files, so that we may independently evaluate findings in the DEIS that the preferred project will not interfere with the maintenance of the National Ambient Air Quality Standards (NAAQS) for carbon monoxide.

The carbon monoxide hot spot analysis currently does not evaluate the Manchester Carbon Monoxide Maintenance Area, preventing a positive project-level conformity determination. The current microscale carbon monoxide analyses evaluated impacts at five locations: I-93 exit 2 (northbound and southbound off-ramps) in Salem New Hampshire, I-93 exit 3 in Windham, New Hampshire, at Fordway and NH 102 in Derry New Hampshire, as well as a highway right-of-way location south of exit 1. As none of these locations are within the Manchester Carbon Monoxide Maintenance Area, EPA recommends that consideration be given to evaluating additional locations such as the Interstate-93 connections to and from Interstate-293, and local City of Manchester roadway intersections that are affected by the I-93 widening (for example, Bodwell

Road, Mammoth Road, Island Pond Road and Cohas Avenue). In order to satisfy the carbon monoxide hot spot analysis for project level conformity, roadway locations within the maintenance area must be evaluated.

References Cited

Andren, H. and P. Angelstam. 1988. Elevated predation rates as an edge in habitat islands: experimental evidence. Ecology 69:544-547.

Ashley, E. P., and J. T. Robinson. 1996. Road mortality of amphibians, reptiles, and other wildlife on the Long Point causeway, lake Erie, Ontario. Canadian Field-Naturalist 110:403-412

Brown, A.L., and J.A. Litvaitis. 1995. Habitat features associated with predation of New England cottontails: what scale is appropriate? Can. J. Zool. 73: pp. 14-20.

Forman, R.T. 2000. Estimate of the Area Affected Ecologically by the Road System in the United States Conservation Biology, Vol. 14, pp. 31-35.

Forman, R.T. and R. D. Deblinger. 2000. The Ecological Road-Effect Zone of a Massachusetts (U.S.A.) Suburban Highway Conservation Biology, Vol. 14, pp. 36-46.

Gibbs, J.P., and Shriver W.G. 2002. Estimating the effects of Road Mortality on Turtle Populations. Conservation Biology Volume 16, 6:1-7.

Harris, L.D. and P.B. Gallagher. 1989. New Initiatives for Wildlife Conservation: The Need for Movement Corridors, in Preserving Communities and Corridors, Defenders of Wildlife, Washington, D.C.

Robbins, C. S. 1979. Effect of forest fragmentation on bird communities. Pages 198-212 in R. M. DeGraaf and K. E. Evans, eds. Management of northcentral and northeastern forests for nongame birds. Gen. Tech. Rep. NC-51, USDA, For. Serv., St. Paul, MN.

Soulé, M. E.. et al. 1988. Reconstructed dynamics of rapid extinctions of chaparral-requiring birds in urban habitat islands. Conserv. Biol. 2:75-92.

Trombulak, S. C. and C. A. Frissell. 2000. Review of the Ecological Effects of Roads on Terrestrial and Aquatic Communities Conservation Biology, Vol. 14, pp. 18-30.